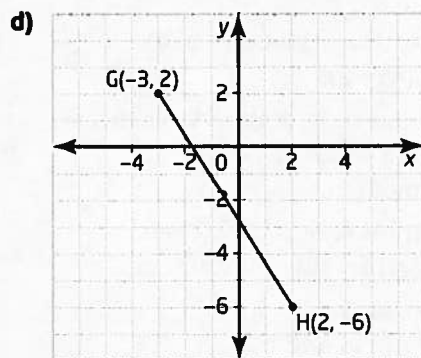
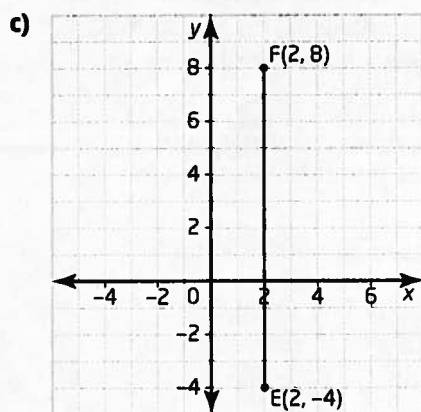
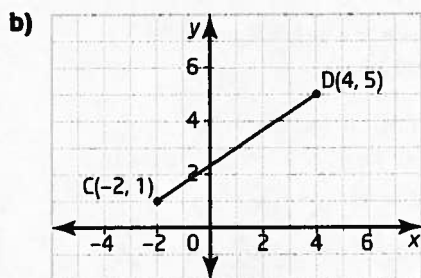
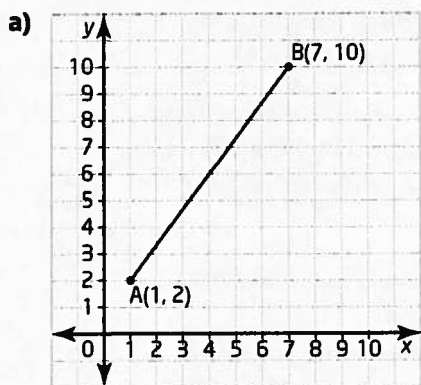


## Practise

For help with questions 1 to 3, see Example 1.

1. Determine the coordinates of the midpoint of each line segment.



2. Determine the coordinates of the midpoint of the line segment defined by each pair of endpoints.

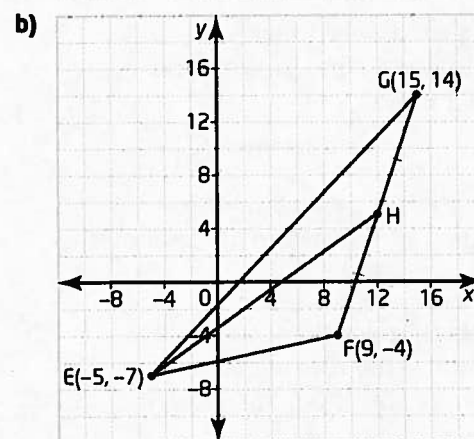
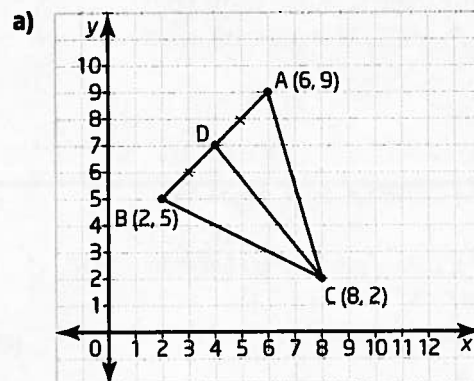
- a) J(5, 7) and K(3, 9)  
 b) L(-1, 0) and M(1, -6)  
 c) N(-2, -4) and P(-2, 8)  
 d) Q(-3, -3) and R(-1, -7)

3. Determine the coordinates of the midpoint of the line segment defined by each pair of endpoints.

- a) J(0.2, 1.5) and K(3.6, 0.2)  
 b) N(-1.4, -3.2) and P(0.6, -5.3)  
 c)  $L\left(\frac{1}{2}, \frac{5}{2}\right)$  and  $M\left(\frac{3}{2}, -\frac{5}{2}\right)$   
 d)  $Q\left(-\frac{3}{8}, \frac{1}{8}\right)$  and  $R\left(2, -\frac{7}{8}\right)$

For help with question 4, see Example 2.

4. Find the slope of each median shown.



## Connect and Apply

5. A charity is organizing a fundraising run along a straight section of highway. On the grid of a roadmap, the starting point is at (23.6, 38.0) and the finish line is at (79.4, 43.8). The charity wants to set up a checkpoint table with water for the runners at the halfway point. Find the coordinates of this checkpoint.
6. The endpoints of the diameter of a circle are  $P(-7, -4)$  and  $Q(-1, 10)$ . Find the coordinates of the centre of this circle.
7. **Use Technology** Use *The Geometer's Sketchpad*® or Cabri® Jr. to verify your answer to question 6. Describe the method you used.
8. The vertices of  $\triangle ABC$  are  $A(4, 4)$ ,  $B(-6, 2)$ , and  $C(2, 0)$ . Find an equation in slope  $y$ -intercept form for the median from vertex  $A$ .
9. **Use Technology** Use *The Geometer's Sketchpad*® or Cabri® Jr. to verify your answer to question 8. Describe the method you used.
10. For the triangle with vertices  $P(-2, 0)$ ,  $Q(4, 6)$ , and  $R(5, -3)$ , find an equation for the median from
  - a) vertex  $P$
  - b) vertex  $Q$
11. **Use Technology** Use geometry software to check your answer to question 10. Describe your method.
12. Write an expression for the coordinates of the midpoint of the line segment with endpoints  $P(a, b)$  and  $Q(3a, 2b)$ . Explain your reasoning.
13. A line segment with one end at  $C(6, 5)$  has midpoint  $M(4, 2)$ .
  - a) Determine the coordinates of the other endpoint,  $D$ .
  - b) Explain your solution.
  - c) Describe a method you could use to check your answer to part a).
14. One endpoint of a diameter of a circle centred on the origin is  $(-3, 4)$ . Find the coordinates of the other endpoint of this diameter.
15. One radius of a circle has endpoints  $D(2, 4)$  and  $E(-1, 2)$ .
  - a) Find a possible endpoint for the diameter that contains this radius.
  - b) Explain why there are two possible answers in part a).
16. Determine an equation for the right bisector of the line segment with endpoints  $P(-5, -2)$  and  $Q(3, 6)$ .
17. A telecommunications company wants to build a relay tower that is the same distance from two adjacent towns. On a local map, the towns have coordinates  $(2, 6)$  and  $(10, 0)$ .
  - a) Explain how you could use a right bisector to find possible locations for the tower.
  - b) Find an equation for this bisector.
18. **Use Technology** Use *The Geometer's Sketchpad*® or Cabri® Jr. to verify your answer to question 17. Describe the method you used.
19.
  - a) Draw  $\triangle ABC$  with vertices  $A(-2, 0)$ ,  $B(8, 8)$ , and  $C(4, -2)$ .
  - b) Draw the median from vertex  $A$ . Then, find an equation in slope  $y$ -intercept form for this median.
  - c) Draw the right bisector of  $BC$ . Then, find an equation for this right bisector.
  - d) Use your drawing to check your answers for parts b) and c).

### Technology Tip

You can use geometry software to display an equation for a line:

- With *The Geometer's Sketchpad*®, choose **Equation** from the **Measure** menu.
- With Cabri® Jr., choose **Coord.&Eq.** from the **F5** menu.